When Trade Discourages Political Favoritism: Evidence from China

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October 2016

Abstract

Developing country governments often distort resource allocation by protecting politically favored firms. If trade liberalization increases the cost of protection, it may discourage political favoritism and thereby improve allocative efficiency. China's WTO accession is studied to investigate whether or not trade liberalization leads to the reallocation of market share from politically favored but less productive state-owned enterprises (SOEs) to more productive non-SOEs. Trade liberalization is found to have induced a 12.25 percentage-point decline in the employment share of SOEs. The decline was driven by an increase in import competition and took place at the intensive margin and through intra-industry reallocation of production. Interestingly, the decline was linked to political affiliation: SOEs affiliated with city, county and township governments were the worst hit, while those affiliated with the central and provincial governments were less affected. These results suggest that apart from the familiar sources of gains from trade, trade can also deliver welfare gains by reducing inefficiencies arising from the political distortions.

Keywords: Political Favoritism; Trade liberalization; WTO; Difference-in-differences; State-owned enterprises

JEL Codes: F14, O53, P31, P33

1 Introduction

Political favoritism is prevalent in the world, especially in developing economies.[1] Such active government intervention can distort resource allocation and consequently lower efficiency. Inefficient firms can be kept alive due to their political connections (the extensive margin distortion), employing resources suboptimally and so also distorting the intensive margin. Eliminating inefficient favoritism can then yield large efficiency gains, as has been documented in recent studies (e.g., Khandelwal, Schott, and Wei, 2013).

This paper evaluates whether or not trade competition can reduce domestic political favoritism, and if so, through which channels. These questions are addressed using China as the context. Despite being the world's largest developing economy, China is widely viewed as having severe domestic favoritism. It is well-documented that state-owned enterprises (SOEs) in China enjoy favorable access to resources such as cheap credit and land,[2] even though they are often less efficient than competitors which are not state-owned.[3] This paper will examine whether and how trade competition after China's accession to the World Trade Organization (WTO) reduces the market share of the inefficient but politically favored SOEs.

The empirical analysis uses data from China's Annual Survey of Industrial Firms from 1998 to 2007. This is the most comprehensive firm-level data describing Chinese manufacturing industries. Employing the estimation strategy in Topalova (2007), we use China's accession to the WTO in December 2001 to conduct a difference-in-differences (DD) analysis of Chinese cities. The identification strategy exploits variations in city-level industrial composition, which generated differential trade shocks across cities after tariffs were lowered. This allows comparing the shares of SOEs in cities that experienced greater trade liberalization with those that experienced less (the first difference) before and after China's WTO accession (the second difference).

We obtain two sets of results. First, we find that trade liberalization significantly reduced the SOEs' share. In our preferred specification, trade liberalization induced a 12.25 percent decline in SOEs' employment share between 1998 and 2007, accounting for 34.85% of the

[1] Holder and Raschky (2014) present an example of favoritism regarding Mobutu Sese Seko, the former dictator in Zaire. "He [Mobutu] had bank accounts and properties all over the world, but most lavishly spent 'his' money in Gbadolite, a small town in Equateur province in remote northeastern Zaire. ... There he built a huge palace complex costing $100 million, luxury guesthouses, and an airport capable of handling supersonic Concordes with Mobutu often chartered for his trips abroad."

[2] According to Liu and Zhou (2011), large and medium-sized private firms in China pay an average interest rate 6 percentage-points higher than SOEs of similar size. The average interest rate of small firms which are not state-owned is 9 percentage-points higher.

[3] According to the Chinese Statistical Yearbook, the merged ROA of China's industrial SOEs was 3.0% in 2002, while that of foreign-invested firms was 6% and that of domestic private firms was 5.6%. (See also World Bank and Development Research Center of the State Council, P.R.C., 2012, ch. 3.)

actual decline of SOEs' employment share observed during this period.[4]

Second, we conduct four analyses to understand what caused the decline of the SOEs' share after trade liberalization. Increased import competition would raise the costs for (and/or reduce the rents paid to) Chinese governments to maintain political favoritism, resulting in the decline of favoritism, a similar idea to Becker's (1957) work on competition and discrimination. A competing theory follows the standard trade theory with firm heterogeneity (e.g., Melitz, 2003); that is, as SOEs are less productive than non-SOEs, trade competition drives out low productive firms that happens to be more SOEs. To differentiate these two explanations, we decompose the effect into changes in the SOEs' share within a productivity quantile having SOEs and non-SOEs with similar productivity levels and changes in the quantile size, and find that the former explains all the changes. These results lend support to the political favoritism argument but not to the firm heterogeneity trade theory.

Our further investigation indicates that the contraction of SOEs' share after trade liberalization took place across a variety of industries and was not confined to the industries initially dominated by SOEs. And the contraction occurred mostly at the intensive margin (i.e., due to surviving SOEs losing shares) instead of the extensive margin (i.e., due to firm entry and exit).

Interestingly, we also find that SOEs affiliated with city governments or below were more likely to contract after China's WTO accession, while SOEs affiliated with higher levels of governments (central and provincial) were largely unaffected. Since the fiscal health of higher-level Chinese governments was far superior to that of the counties and townships,[5] this finding provides further evidence that the increased costs of supporting inefficient firms after China entered the WTO contributed to the observed decline in SOE shares.

Our work is related to several strands of the literature. First, our paper engages studies that investigate the mitigating effects of trade on export distortions (e.g., Khandelwal, Schott, and Wei 2013), tax distortions (e.g., Konan and Maskus 2000), and labor market distortions (e.g., Krishna, Yavas, and Mukhopadhyay 2005; Krishna and Yavas 2005). Khandelwal, Schott, and Wei (2013) have shown that upon the expiration of the Multifiber Arrangement (MFA) in 2005, new entrants in China, most of them non-SOEs, expanded the volume of Chinese textile and clothing exports while driving down their prices. According

[4]The city-level average employment share of Chinese SOEs fell from 67.93% in 1998 to 32.78% in 2007. Besides trade liberalization, other factors that contributed to this decline include SOE reform and the relaxation of FDI regulations. See Section 3 for a detailed discussion.

[5]Local governments in China shoulder 80% of all public expenditure responsibilities but receive only 40% of the tax revenues (World Bank and Development Research Center of the State Council, P.R.C. 2012, Figure 0.8).

to their structural estimation, an improved allocation of export quotas accounts for 71% of China's overall gains from the expiration of the MFA.

There is a growing literature looking at China's accession to the WTO, and their findings overwhelmingly indicate that the WTO membership benefits China. Chen, Ma, and Xu (2014) propose a generalized trade restrictiveness index and use it to confirm the WTO's effectiveness in removing tariff barriers in China, while Yu (2015) detects a positive impact of WTO-associated tariff reduction on the productivity of Chinese firms. Brandt, Van Biesebroeck, and Zhang (2012) have document the fact that between 1998 and 2007 the productivity of incumbent firms grew at a weighted average rate of 2.9 to 8.0% annually. Exploring sectoral variations in tariff reduction after the WTO accession, Brandt, Van Biesebroeck, Wang, and Zhang (2012) show that trade liberalization reduced firms' prices and also their markups. Fan, Li, and Yeaple (2015) find that WTO accession led to an improvement in the quality of Chinese exports. According to Han, Liu, and Zhang (2012), China's WTO accession significantly increased wage inequality, but much of that resulted from an increase in returns to education. Using cross-sectional and panel data, Lan and Li (2015) have shown that trade weakens nationalism in China.

Finally, our study contributes to the literature on SOEs in China. Song, Storesletten, and Zilibotti (2011) have shown that the presence of inefficient but politically favored SOEs helps create the puzzling coexistence of high returns to capital and a growing foreign surplus in China. Du, Lu, Tao, and Yu (2012) have argued that SOEs are costly to the Chinese economy not only because they have poor production efficiency, but also because their market power exceeds that of other firms. Li, Liu, and Wang (2015) found that the SOEs' improved performance in recent years is driven not by a genuine improvement in efficiency but by the consolidation of a vertical industry structure whereby the SOEs monopolize key upstream industries while other firms compete in downstream industries. Likewise, Tang, Wang, and Wang (2015) show that SOEs register significantly higher ratios of domestic value added in exports than foreign-invested firms and large domestic non-SOEs. They attribute this finding to the vertical structure of Chinese industry.

The rest of the paper is organized as follows: Section 2 discusses our estimation strategy in details. In Section 3, we present our empirical findings and robustness checks. The mechanism analyses are conducted in Section 4. Section 5 concludes.

2 Estimation Strategy

2.1 China's WTO Accession

In July 1986 China notified the GATT (the predecessor of the WTO) that it would like to resume its status as a GATT contracting party. Between 1987 and 1992, as the Chinese leaders argued among themselves about the nation's economic reform agenda, China's return to GATT affiliation was suspended. The momentum resumed after Deng Xiaoping's southern tour and speech in 1992, and in July 1995 China officially filed its application to join the WTO.

The pivotal part of China's WTO accession process involved bilateral negotiations between China and the existing members of the WTO. The first country that signed a bilateral WTO accession agreement with China was New Zealand (in August 1997) . The negotiation between China and the U.S. was the toughest. It took the two countries four years and twenty-five rounds of negotiation before an agreement was reached in November 1999. Subsequently, China reached agreements with nineteen countries within half a year, including Canada in November 1999 and the European Union in May 2000. In September 2001, China concluded the agreement with Mexico, which marked the completion of negotiations with all WTO member countries. Finally, the WTO's Ministerial Conference approved by consensus the text of the agreement for China's entry into the WTO on November 10, 2001.

To illustrate its commitment to joining the WTO, China cut its tariffs substantially between 1992 and 1997. In 1992, China's (unweighted) average tariff rate was as high as 42.9%. Shortly after the GATT's Uruguay round negotiations China lowered its tariffs from an average rate of 35% in 1994 to 17% in 1997. They then remained stable until China officially joined the WTO on December 11, 2001. From 2002 onward China took steps to fulfill its tariff reduction responsibilities as a WTO member. The accession agreement specified that China would fulfill its promised tariff cuts by 2004 (with a few exceptions to be completed by 2010) and the average tariff rates for agricultural and manufactured products would be reduced to 15% and 8.9% respectively.

Figure 1 plots China's (unweighted) average tariffs for the period 1996–2007 showing the substantial drop in 1996. This was followed by a relatively stable period between 1997 and 2001 and another round of gradual cuts in 2002, before a steady state was reached in 2007. The dispersion of tariff rates was also significantly reduced. The figure shows that the gap between the 25th and 75th percentiles narrowed sharply in 2002 and only stabilized after 2007.

[Insert Figure 1 here]

Figure 2 shows the relationship between tariff rates in 2001 and tariff rate changes between 2001 and 2007 across four-digit industries (the unit that we use to construct the city-level exposure to trade liberalization; see Section 2.3 for details).[6] The strong, positive correlation indicates that industries with higher tariffs before China's WTO accession experienced more tariff reduction afterward. This is perhaps unsurprising, since China was free to set different tariffs for different industries before 2001 but lost that freedom when it became a WTO member and had to reduce tariff rates to the WTO-determined levels, which are relatively uniform across products.

[Insert Figure 2 here]

2.2 Data

The main data set used in this study comes from the 1998–2007 Annual Survey of Industrial Firms (ASIF), conducted by China's National Bureau of Statistics (NBS). It is the most comprehensive firm-level dataset in China.[7] The data cover all state-owned enterprises (SOEs) and non-SOEs with annual sales exceeding 5 million Chinese yuan (about US$827,000). The number of firms covered varies from over 140,000 in the late 1990s to over 310,000 in 2007, spanning all thirty-one provinces or province-level municipalities (covering 340 cities and 2,829 counties) and all manufacturing industries (29 two-digit, 162 three-digit and 425 four-digit industries).[8] The data set provides detailed firm-level information, including firm name, industry affiliation, location, and all operating and performance items reported in accounting statements such as employment, capital, intermediate inputs, and ownership.

Comparing the performance of SOEs and non-SOEs requires first identifying the SOEs in the sample. We apply the definition of SOEs proposed by Hsieh and Song (2013), who classify a firm as an SOE if (a) more than 50% of its registered capital is held directly by

[6] The pattern at the HS-6 product level is similar (results available upon request).

[7] This dataset is noted for its representativeness because the firms sampled contribute the bulk of China's industrial value added. The dataset is used to calculate key national economic indicators including GDP, and other statistics published in China's official statistical yearbooks. This dataset has been found to be reasonably accurate and reliable due to strict double-checking procedures in the data collection process (Cai and Liu 2009). Thus, it has been widely used by economics researchers in recent years (Bai, Lu, and Tao 2009; Cai and Liu 2009; Lu, Lu, and Tao 2010; Brandt, Van Biesebroeck, and Zhang 2012).

[8] During the period sampled, there were some adjustments in China's administrative boundaries. In some cases, new counties were established. In others, existing counties were merged to form larger counties or cities. To maintain consistency in our coding of cities and counties, we use the 1999 National Standard (promulgated at the end of 1998 and known as the GB/T 2260-1999) as the benchmark codes and convert the regional codes of all firms to these benchmark codes. Separately, in 2003 a new classification system for industry codes (GB/T 4754-2002) replaced the old classification system (GB/T 4754-1994) in use from 1995 to 2002. To maintain consistency in our coding of industries for the entire period sampled (1998–2007), we use the concordance table constructed by Brandt, Van Biesebroeck, and Zhang (2012).

the state or (b) the ASIF data identifies the state as the controlling shareholder of the firm. As a robustness check we use self-reported ownership status as an alternative definition. Specifically, according to the NBS categorization, SOEs correspond to specific registered ownership types in the data: state-owned enterprises, state-associated enterprises, state and collectively-owned enterprises, and enterprises funded solely by the state.

The data on Chinese tariffs are downloaded from the WTO's website. Its *Tariff Download Facility* provides standardized tariff statistics. For each product defined at the HS-6 level, the tariff data provide detailed information including the number of tariff lines and the average, minimum, and maximum ad valorem tariff duties. The tariff data is available for 1996, 1997 and 2001 (the latest). As the WTO website does not provide tariff information for 1998–2000, information from the World Integrated Trade Solution website maintained by the World Bank is used to fill the void. Since different HS codes are used before and after 2002, the 1996 HS codes (used in the 1997–2001 tariff schedules) are converted to the 2002 HS codes (used in the 2002–2006 tariff schedules) using the standard HS concordance table. Furthermore, as the ASIF data is classified at the industry level, tariffs from the product level of the HS are aggregated to the industry level by matching the HS classification with the Chinese Industrial Classification (CIC) system using the concordance table published by the NBS.[9] The simple average tariff for each industry and each year is then calculated.

2.3 Estimation Specification

To examine the differential impacts of trade liberalization on SOEs and non-SOEs, we follow the locality-event DD approach devised by Topalova (2007).[10] Industrial activity varied greatly among Chinese cities before China's WTO accession, so the sudden tariff reduction upon accession generated differential impacts on the cities. That allows identifying the effect of trade liberalization specifically on SOEs.

The analysis is conducted at the city level instead of the industry level because, generally speaking, SOEs in China are affiliated a particular government unit—if not the central government, then a province, city, county or township. They are not usually owned by a functional unit such as a ministry or industrial bureau. Also, city-level analysis allows capturing the general equilibrium effect of trade liberalization on SOEs' activities. For example, trade liberalization may affect the prices of local tradable and non-tradable goods

[9] We thank Yifan Zhang for sharing this concordance table.

[10] For studies applying this identification strategy, see Hasan, Mitra, and Ural (2007); Edmonds, Pavcnik, and Topalova (2010); Hakobyan and McLaren (2016); Topalova (2010); McCaig (2011); Hasan, Mitra, Ranjan, and Ahsan (2012); Autor, Dorn, and Hanson (2013). See Kovak (2013) for the microeconomic foundations of this identification strategy.

as well as local wages and employment rates.[11]

The specification of the DD estimation is:

$$SOE_{ct} = \alpha_c + \beta Tariff_{ct} + \lambda_t + \alpha_c t + \varepsilon_{ct}, \tag{1}$$

where c and t represent city and year, respectively, and ε_{ct} is the error term. To deal with potential heteroskedasticity and serial autocorrelation the standard errors are clustered at the city level (as recommended in Bertrand, Duflo, and Mullainathan 2004).

α_c is the city fixed effect, controlling for all time-invariant differences among the cities such as geography, etc. λ_t is the year fixed effect controlling for any annual shocks common to cities such as business cycles, monetary policies, exchange rate shocks, etc. $\alpha_c \cdot t$ is the city-specific linear trend, controlling for all unobservables that affect cities in a linear way.

The outcome variable, SOE_{ct}, measures the share of SOEs in city c at year t. In the benchmark analysis, we focus on the employment share of SOEs over all firms. There are four potential concerns involved in the SOE share measurement. First, the ASIF data is truncated as small non-SOEs (i.e., those with annual sales below 5 million RMB) are not sampled. Hence, if trade liberalization results in both small SOEs and non-SOEs exiting the market, the analysis would mistakenly detect a stronger trade effect on SOEs than on non-SOEs due to the truncated data. To address that concern, SOEs with annual sales below 5 million Chinese yuan are excluded as a robustness check. Then, when calculating the employment share of SOEs, SOEs, non-SOE local firms and foreign-invested firms are all included. It is possible that an observed fall in the employment share of SOEs could be driven by a surge in hiring among foreign firms that is not at the expense of the SOEs. To address that concern, the employment of foreign firms is excluded when calculating the employment share of SOEs as another robustness check. Third, firms can sell in the domestic market as well as overseas. To the extent that tariff reduction affects mostly domestic competition, one may be concerned that including foreign employment might bias the results. As a robustness check, foreign employment is excluded in calculating the outcome variable. And finally, one could be concerned about the SOEs' hoarding labor. That would cripple employment share as a measure. As another robustness check, the output share of SOEs is used.

The regressor of interest, $Tariff_{ct}$, captures the city-level exposure to trade liberalization. Specifically, it is measured as

$$Tariff_{ct} = \frac{\sum_i Emp_{ic2001} \times Tariff_{it}}{\sum_i Emp_{ic2001}}, \tag{2}$$

[11] Nonetheless, trade liberalization's effects on SOEs are also investigated at the industry level, applying a DD specification used by Lu and Yu (2015). The results (available on request) show a pattern consistent with the primary analysis; that is, trade liberalization reduced the SOEs' share.

where i represents the manufacturing industry; Emp_{ic2001} is the total employment of industry i in city c in 2001; and $Tariff_{it}$ is the import tariff rate of industry i in year t.

2.4 Threats to Identification

A crucial assumption to obtain an unbiased estimate of β in equation (1) is that conditional on the covariates, the regressor of interest is uncorrelated with the error term, i.e.,

$$E\left[\varepsilon_{ct}|Tariff_{ct}, \alpha_c, \lambda_t, \alpha_c t\right] = E\left[\varepsilon_{ct}|\alpha_c, \lambda_t, \alpha_c t\right]. \tag{3}$$

One primary threat to this identifying assumption is that the schedule of tariff reductions upon China's WTO accession could have been prepared in response to domestic political considerations, in particular the protection of SOEs. To investigate this possible endogeneity of trade liberalization, the approach of Topalova and Khandelwal (2011) is applied in conducting two analyses. The first examines whether regional variations in tariff changes in the post-WTO period correlated with initial politically important characterisitcs. Specifically, we regress the change in $Tariff_{ct}$ from 2001 to 2007 on various city-level characteristics in 2001. These characteristics include output, employment, capital (to proxy for any size effect in setting the tariff schedule), capital-labor ratio (to reflect the technological advances in a city with abundant labor), average wages (to capture any protection of poorly-skilled workers), growth in output, and growth in employment in the pre-WTO period. The estimation results are reported in Table 1. Four out of seven estimated coefficients are highly insignificant while three has the statistical significance. But none of these seven coefficients are economically signficant. Nonetheless, we control for the differential effects between the pre- and post-WTO periods generated by these initial city characteristics in the analysis; that is, we add $\mathbf{Z}_{c,2001} \cdot Post02_t$ in equation (1), where $\mathbf{Z}_{c,2001}$ is a vector of city characteristics in Table 1, and $Post02_t$ is an indicator of the post-WTO period.

[Insert Table 1 here]

To check whether tariffs were adjusted in response to the SOEs' share, we regress the tariffs in year t ($Tariff_{ct}$) on the SOEs' share in year $t-1$ (SOE_{ct-1}). The estimation results are reported in Table 2 using both employment share and output share. The coefficients are statistically insignificant and the magnitudes are close to zero.

[Insert Table 2 here]

These two exercises suggest that the tariff changes were not significantly influenced by pre-WTO politically-important city characterisitics. China's tariff schedule after its WTO accession was not determined largely by domestic considerations; it arose instead from the outcome of rounds of negotiations with all the existing WTO members. Hence, China's tariff schedule could be considered largely exogenous to the domestic political environment. Still, to further alleviate any concern that a city's employment structure in 2001 might have influenced the SOEs' share and contaminated the estimates, we follow Topalova (2010) to include each city's employment composition at the sectoral level in 2001 interacted with the post-WTO period indicator.

Another concern lies in the multidimensional features of the WTO accession. Specifically, after China joined the WTO its trading partners also lowered their tariffs on Chinese imports, which increased market access for Chinese producers. The Chinese producers could also enjoy lower tariffs on imported intermediate inputs, which have been shown to have increased their productivity (e.g., Amiti and Konings, 2007; Halpern, Koren, and Szeidl, 2015). And as part of the WTO accession negotiations China relaxed its FDI entry regulations in 2002 with further relaxations in 2004. If the entry of foreign multinationals generated differential effects on SOEs and non-SOEs (such as the spillover effects), that would influence the estimates. To address these concerns, we include $\mathbf{X}_{ct}$ in equation (1), which include city-level export tariffs,[12] input tariffs,[13] and foreign direct investment. We further include an indicator for special economic zones (SEZs), which is 1 if a city is an open economic area, and 0 otherwise to control for regional policies toward foreign trade and investment.

The augmented DD specification is:

$$SOE_{ct} = \alpha_c + \beta Tariff_{ct} + \lambda_t + \alpha_c t + \mathbf{X}'_{ct}\boldsymbol{\gamma} + \mathbf{Z}_{i2001} \cdot Post02_t + \varepsilon_{ct}. \tag{5}$$

As a further validity check, we conduct a placebo test using only the pre-WTO accession period data as in Topalova (2010). For details, see Section 3.2.

[12] Specifically,

$$Export\ Tariff_{ct}^{export} = \frac{\sum_i Emp_{ic2001} \times Tariff_{it}^{external}}{\sum_i Emp_{ic2001}}, \tag{4}$$

where $Tariff_{it}^{external} = \sum_f Tariff_{fit} \times \frac{export_{fit}}{export_{fit}}$; $Tariff_{fit}$ is foreign country f's tariffs on Chinese imports of industry i in year t; $export_{fit}$ is Chinese total exports of industry i to foreign country f in yeat t; and $export_{it}$ is the total exports of industry i in year t.

[13] Specifically,

$$Input\ Tariff_{ct}^{input} = \frac{\sum_i Output_{ic2001} \times Tariff_{it}^{input}}{\sum_i Output_{ic2001}}$$

where $Tariff_{it}^{input} = \sum_k Tariff_{kt} \times \omega_{ki}$ and ω_{ki} is the share of inputs from industry k used by industry i, based on the 1997 Chinese input-output table.

3 Empirical Findings

3.1 Main Results

The regression results of the DD specification (1) are reported in column 1 of Table 3. Cities with higher tariffs experienced a larger decline in their SOEs' share. In other words, trade liberalization reduced the importance of SOEs.

[Insert Table 3 here]

To control for other features of the WTO accession and focus on the idea of trade competition, we include input tariffs and export tariffs in column 2, and then the FDI entry deregulation in column 3. The coefficients remain positive and statistically significant, and the magnitude becomes even larger. These results imply that there are some interactions among different aspects of the WTO accession (i.e., the access to cheaper imported intermediate inputs and foreign markets increase the employment share of SOEs), and hence, conditioning out those other channels is important for establishing the effect of trade competition.

The coefficient in column 4 includes the effect of the SEZ indicator to control for domestic policy towards international trade and investment. The results remain robust with the magnitude barely changed. In columns 5 and 6 terms representing the interaction between the city employment composition at the sectoral level in 2001 and the post-WTO period indicator and between initial city-level political characteristics and the post-WTO period indicator are included to control for potential endogeneity of the employment structure in 2001 and the city tariff schedules, respectively. Tariffs continue to have a positive and statistically significant effect on the SOEs' employment share, with the magnitude becoming even larger.

In summary, we find that trade liberalization contributes to the decline of SOEs' share of employment. This effect is mainly caused by changes in the output tariffs rather than the input tariffs, export tariffs, FDI deregulation or China's SEZ policy. The results remain robust to including controls the potential endogeneity of the initial city employment structure and the endogeneity of city tariff changes.

3.2 Economic Magnitude

To gauge the economic magnitude of our estimates, we conduct the following exercise: The mean value city-level tariff is 18.99% in 1998 and 9.99% in 2007. Hence, the predicted change

in the SOEs' employment share from 1998 to 2007 is $-(18.99\% - 9.99\%) \times 1.361 = -12.25\%$, where 1.361 is the estimated coefficient of interest from column 7 of Table 3. Meanwhile, the SOEs' actual mean share of employment fell from 67.93% to 32.78% between 1998 and 2007. So trade liberalization can account for $12.25\%/(67.93\% - 32.78\%) = 34.85\%$ of the total change in the SOEs' employment share.

3.3 Robustness Checks

In this subsection, we report results of a battery of robustness checks on our aforementioned DD estimation.

Alternative definition of an SOE. Column 1 of Table 4 presents similar results using an alternative definition of an SOE. Each firm self-reported its ownership type in the data using the NBS categories. The following ownership types are classified as SOEs: state-owned enterprises, state-associated enterprises, state and collectively-owned enterprises, and enterprises funded solely by the state. The results remain robust with this alternative SOE definition.

[Insert Table 4 here]

SOE share measurement. As has been explained, there are potential concerns about the truncated data structure, the inclusion of foreign firms, the inclusion of exports, and labor hoarding. The results of robustness checks examining those concerns are reported in columns 2–5 of Table 4. First, SOEs with sales below 5 million Chinese yuan are excluded (column 2). Then employment in foreign firms is excluded in the denominator of the SOE employment share calculation (column 3). The figure in column 4 is calculated after excluding the employment content of the exports. And finally the output share is used to address the possibility of labor hoarding. All of these alternative estimations yield results similar to those of the main analysis.

SOE privitization. China initiated a round of SOE reform in the late 1990s which was still ongoing in the early 2000s. The effects are investigated in three supplementary analyses. First, the percentage of SOEs that were being privatized is included as an additional control with the results reported in column 6 of Table 4. The findings remain robust. The second check focuses on a subsample of firms that did not experience a change in ownership status (i.e., they were either SOEs or non-SOEs throughout the period studied). The results, reported in column 7 of Table 4, remain robust. Finally, the degree of privatization is

taken as the outcome variable in column 8 of Table 4, and this is barely affected by trade liberalization.

Placebo test. The effect of tariff changes on the SOE share in the pre-WTO accession period (1998–2001) is used as a placebo test (Topalova 2010). Since tariffs did not change much during that period, any effect should have been muted; otherwise, it may indicate the existence of some underlying confounding factors. As column 9 of Table 4 shows, tariff changes indeed have no significant effect on the SOE employment share in the pre-WTO accession period.

4 Mechanism

In the previous section, we establish that trade liberalization (induced by accession to the WTO) substantially reduced the SOE share in China. To shed light on the underlying mechanisms, we first examine whether or not the effects of trade liberalization come from change in the SOEs' behavior relative to non-SOEs' with similar productivity levels, or whether they come from a decline of productivity quantiles with more SOEs. The next analysis investigates whether the decline in SOE activity is due to within-industry reallocation (i.e., declines in the SOEs' employment shares within each industry) or cross-industry reallocation (i.e., shrinkage of SOE-dominated industries). We then decompose the trade effect into extensive (i.e., entry and exit) and intensive (i.e., output changes of surviving firms) margins. Finally, to what extent SOEs affiliated with different layers of government responds to trade liberalization differently is explored.

4.1 Productivity or Favoritism

Numerous studies have established that SOEs are less productive than non-SOEs (e.g., Li 1997; Song, Storesletten, and Zilibotti 2011; Du, Lu, Tao, and Yu 2015). If trade competition drives out less productive firms as Melitz (2003) has shown, then it is expected that the SOE share should fall. In other words, the decline in the SOE share after trade liberalization may not reflect competition disciplining political favoritism; it could also be explained by standard trade competition arguments.

To distinguish those two explanations, a further analysis is examined whether the fall in the SOEs' share is a fall within a quantile of SOEs and non-SOEs with similar productivity levels, or whether it is due to declines of the quantiles with more SOEs. The entire distribution of productivities is divided into deciles and the following decomposition is applied.

$$\begin{aligned}\Delta y_{ct} &= \sum_j \left(\Delta \frac{Emp_{jct}^{SOE}}{\sum_j Emp_{jct}} \right) = \sum_j (\Delta s_{jct} \theta_{jct}) \\ &\simeq \underbrace{\sum_j \frac{s_{jct}^{SOE} + s_{jct-1}^{SOE}}{2} \triangle \theta_{jct}}_{inter-quantile} + \underbrace{\sum_j \frac{\theta_{jct} + \theta_{jct-1}}{2} \triangle s_{jct}^{SOE}}_{within-quantile}, \end{aligned} \tag{6}$$

where Δ is a first-differenced operator such that $\Delta y_{ct} = y_{ct} - y_{ct-1}$. j indexes the productivity deciles; $s_{jct}^{SOE} \equiv \frac{Emp_{jct}^{SOE}}{Emp_{jct}}$ captures the SOEs' employment share within decile j of city t at time t; and $\theta_{jct} \equiv \frac{Emp_{jct}}{\sum_j Emp_{jct}}$ represents the share of decile j in city c at time t.

In this formulation, $\Delta y_{ct}^{inter} = \sum_j \frac{s_{jct}^{SOE} + s_{jct-1}^{SOE}}{2} \triangle \theta_{jct}$ measures the share change of the whole productivity decile, while $\Delta y_{ct}^{within} = \sum_j \frac{\theta_{jct} + \theta_{jct-1}}{2} \triangle s_{jct}^{SOE}$ measures the change of the SOEs' employment share within a decile. If the decline in the SOEs' employment share was due to the exiting of less productive firms (who are more likely to be SOEs) after trade liberalization, the results would be mostly explained by the change in Δy_{ct}^{inter} rather than in Δy_{ct}^{within}. If the results were due to less political favoritism, the share of the SOEs would be expected to have declined relative to that of non-SOEs with similar productivity levels, or a big change in Δy_{ct}^{within}.

The estimation results are reported in Table 5. We find a large and positive effect of tariffs on Δy_{ct}^{within}, but no statistically and economically significant effect on Δy_{ct}^{inter}. Hence, these results lend support to the political favoritism argument, but not to the standard trade competition argument.

[Insert Table 5 here]

4.2 Intra- vs. Inter-Industry Reallocation

The intensification of import competition may lead to a decline of the SOEs' share within each industry (intra-industry reallocation) or a shrinkage of industries that are dominated by SOEs (inter-industry reallocation). Both effects would cause a decline in the SOEs' share on the city level. To disentangle the intra- and inter-industry effects of trade liberalization, the changes in the SOE employment share in city c at time t (y_{ct}) can be decomposed as

$$\begin{aligned}\Delta y_{ct} &= \sum_i (\Delta s_{ict}\omega_{ict}) \\ &\simeq \underbrace{\sum_i \frac{\omega_{ict}+\omega_{ict-1}}{2}\triangle s_{ict}^{SOE}}_{intra-industry} + \underbrace{\sum_i \frac{s_{ict}^{SOE}+s_{ict-1}^{SOE}}{2}\triangle\omega_{ict}}_{inter-industry} \end{aligned} \tag{7}$$

where i denotes a four-digit industry; $s_{ict}^{SOE} \equiv \frac{Emp_{ict}^{SOE}}{Emp_{ict}}$ captures the SOEs' employment share in industry i of city c at time t; and $\omega_{ict} \equiv \frac{Emp_{ict}}{\sum_i Emp_{ict}}$ represents the share of industry i in city c at time t.

Hence, $\Delta y_{ct}^{intra} = \sum_i \frac{\omega_{ict}+\omega_{ict-1}}{2}\triangle s_{ict}^{SOE}$ captures resource reallocation from SOEs to non-SOEs within an industry; and $\Delta y_{ct}^{inter} = \sum_i \frac{s_{ict}^{SOE}+s_{ict-1}^{SOE}}{2}\triangle\omega_{ict}$ captures resource reallocation from one industry to another.

The regression results are reported in Table 6. We find that output tariffs have both positive and statistically significant effects on intra-industry (column 1) and inter-industry (column 2) resource reallocation, but the former has a much bigger magnitude than the latter. These results imply that the decline in the SOEs' share detected previously is mainly driven by the decline of the SOEs' share within each industry, whereas across industries there is some evidence that the employment of industries with a strong SOE presence decreased after trade liberalization.

[Insert Table 6 here]

4.3 Extensive vs. Intensive Margins

Political favoritism can keep inefficient firms alive (the extensive margin distortion) and also cause more efficient firms to employ more resources than would be optimal (the intensive margin distortion). To study which of these effects best explains the findings, the change in the SOEs' employment share in city c at time t (y_{ct}) is decomposed as follows.

$$\begin{aligned}\Delta y_{ct} &= \Delta\left(\frac{Emp_{ct}^{SOE,\,intensive}+Emp_{ct}^{SOE,\,extensive}}{Emp_{ct}}\right) \\ &= \Delta\left(\frac{Emp_{ct}^{SOE,\,intensive}}{Emp_{ct}^{intensive}}\cdot\frac{Emp_{ct}^{intensive}}{Emp_{ct}}\right)+\Delta\left(\frac{Emp_{ct}^{SOE,\,extensive}}{Emp_{ct}^{extensive}}\cdot\frac{Emp_{ct}^{extensive}}{Emp_{ct}}\right) \\ &\simeq \left(\Delta\frac{Emp_{ct}^{SOE,\,intensive}}{Emp_{ct}^{intensive}}\right)\cdot\frac{\widetilde{Emp_{ct}^{intensive}}}{Emp_{ct}}+\left(\Delta\frac{Emp_{ct}^{SOE,\,extensive}}{Emp_{ct}^{extensive}}\right)\cdot\frac{\widetilde{Emp_{ct}^{extensive}}}{Emp_{ct}},\end{aligned}$$

where $\frac{\widetilde{Emp_{ct}^{intensive}}}{Emp_{ct}} \equiv \left(\frac{Emp_{ct}^{intensive}}{Emp_{ct}} + \frac{Emp_{ct-1}^{intensive}}{Emp_{ct-1}}\right)/2$ and $\frac{\widetilde{Emp_{ct}^{extensive}}}{Emp_{ct}} \equiv \left(\frac{Emp_{ct}^{extensive}}{Emp_{ct}} + \frac{Emp_{ct-1}^{extensive}}{Emp_{ct-1}}\right)/2$. SOEs existing in both time t and $t-1$ are classified as the intensive margin group, while those newly entering in time t are used to construct $Emp_{ct}^{SOE,\ extensive}$ and those exiting in time $t-1$ are used to construct $Emp_{ct-1}^{extensive}$.

The estimation results are reported in Table 7. We find a statistically significant and large intensive margin effect, but a small and insignificant extensive margin effect. These results suggest that the decline in the SOEs' employment share after China's WTO accession is primarily a reduction in the employment share of surviving SOEs. These results echo the findings by Hsieh and Klenow that during this sample period, revenue-based TFP for surviving SOEs increased substantially.

[Insert Table 7 here]

4.4 Response of SOEs with Different Affiliation Levels

China can be administered by different levels government. One would expect that SOEs administered by higher levels of government would enjoy more protection than those administered by lower-levels for at least two reasons: higher-level governments are more powerful by definition; and China's lower-level governments have been encountering structural fiscal problems since the nation's fiscal reforms of 1994 (World Bank and Development Research Center of the State Council, P.R.C. 2012). As such, we use the affiliation of an SOE as a proxy for the degree of government protection it received and investigate whether SOEs administrated by different levels of the Chinese government responded to WTO accession differently. An SOE's affiliation might therefore serve as a proxy for the degree of government protection it enjoyed. The SOEs in the sample are classified as under the administration of a government above the city level (i.e., a central or provincial government) or administered by a city, county or township government. The decomposition using those two categories takes the form

$$\begin{aligned}\Delta y_{ct} &= \Delta\left(\frac{Emp_{ct}^{SOE,\ above} + Emp_{ct}^{SOE,\ below}}{Emp_{ct}}\right) \\ &\simeq \left(\Delta\frac{Emp_{ct}^{SOE,\ above}}{Emp_{ct}^{above}}\right)\cdot\frac{\widetilde{Emp_{ct}^{above}}}{Emp_{ct}} + \left(\Delta\frac{Emp_{ct}^{SOE,\ below}}{Emp_{ct}^{below}}\right)\cdot\frac{\widetilde{Emp_{ct}^{below}}}{Emp_{ct}},\end{aligned}$$

where $Emp_{ct}^{SOE,\ above}$ is the employment of SOEs affiliated with a higher-level administration in city c at time t; $Emp_{ct}^{SOE,\ below}$ is the employment of SOEs affiliated with a lower-

level administration in city c at time t; $\widetilde{\frac{Emp_{ct}^{above}}{Emp_{ct}}} \equiv \left(\frac{Emp_{ct}^{above}}{Emp_{ct}} + \frac{Emp_{ct-1}^{above}}{Emp_{ct-1}}\right)/2$ and $\widetilde{\frac{Emp_{ct}^{below}}{Emp_{ct}}} \equiv \left(\frac{Emp_{ct}^{below}}{Emp_{ct}} + \frac{Emp_{ct-1}^{below}}{Emp_{ct-1}}\right)/2$.

The estimation results are reported in Table 8. We find that the effect on SOEs affiliated with a lower-level administration is positive and statistically significant, but the effect on SOEs affiliated with a high-level administration is small and marginally significant. These results imply that much of the trade liberalization effect operates through the decline of SOEs with weaker political support. In China, the fiscal health of higher-level governments was far superior to that of the counties and townships. For example, local governments in China shoulder 80% of all public expenditure responsibilities but receive only 40% of the tax revenues (World Bank and Development Research Center of the State Council, P.R.C. 2012, Figure 0.8). This finding provides further evidence that the increased costs of maintaining political favoritism after China entered the WTO contributed to the observed decline in the SOEs' share of employment.

[Insert Table 8 here]

5 Conclusion

In this paper, we study how China's accession to the WTO impacts the market share of inefficient but politically favored SOEs. We find that tariff reductions following China's WTO accession led to a decline in the SOEs' share. This result is robust to a variety of robustness checks. In our preferred specification, China's WTO accession led to a 12.25 percentage-point decline in the SOE employment share, which accounted for 34.85 percent of the actual decline in their employment share during the period. These results indicate that trade competition helps discipline domestic political favoritism.

We further verify that the post-WTO accession contraction of the SOEs' share was driven by increased import competition instead of improved access to overseas markets or cheaper imported intermediate goods. The share decline was broad-based and not limited to selected industries where the SOEs were dominant.

Importantly, we find that the SOE share decline took place at the intensive margin, and that SOEs affiliated with the lowest levels of government drove the decline. By contrast, SOEs affiliated with the central and provincial governments were barely affected, even though many of the least productive manufacturing firms in China belonged to this group. Trade discourages political favoritism and improves resource allocation, but the welfare gains are made only at the margin, and some inefficiency is likely to persist as long as the government has the financial ability to support inefficient enterprises. In other words, trade mitigates

but does not solve the problem. Another way of interpreting this finding is to think of trade as a catalyst that lessens existing political distortion of resource allocation. The catalytic effect strengthens as the government's ability to provide discriminatory support weakens.

This study has identified another channel through which trade benefits a nation: by improving resource allocation in the presence of politically-motivated economic distortions. In China, different layers of government responded differently to WTO accession. Some increased their support for the SOEs under their control while others withdrew it. Given the central and complex role that the state still plays in China's economic development, these findings suggest that it is useful and perhaps even important to treat the Chinese state as an agglomeration of component parts instead of a unitary government when studying its behavior and decisions with respect to international trade.

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Figure 1: Tariff rates (1996-2007)

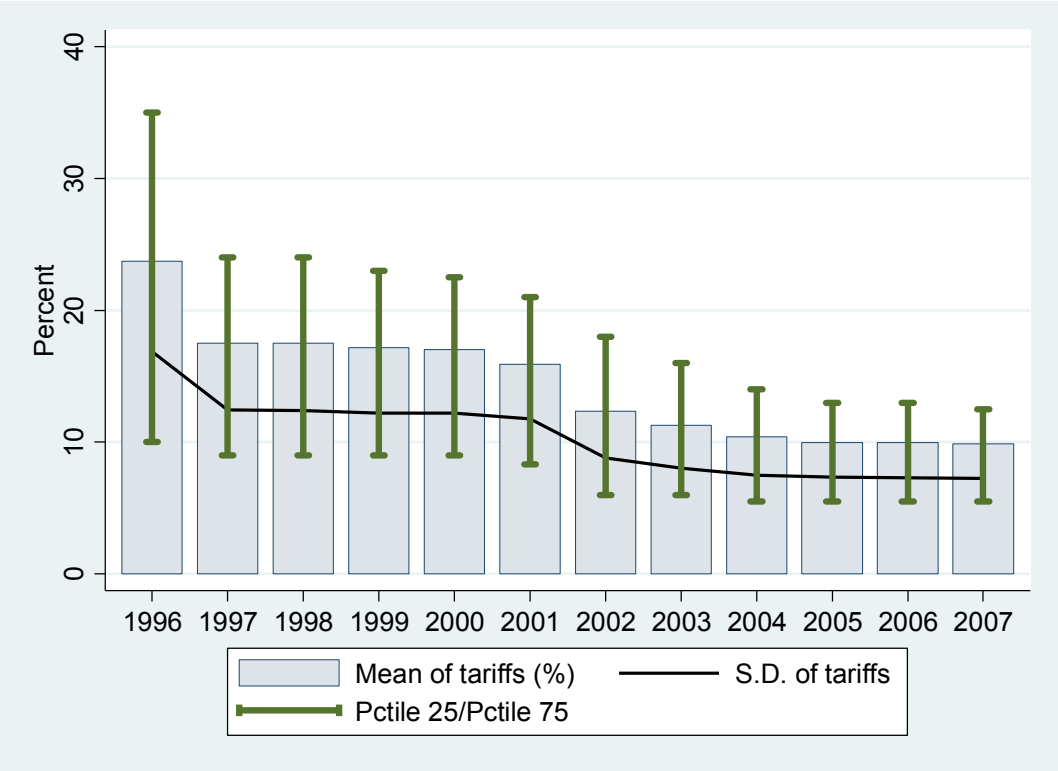

Figure 2: Tariff rates in 2001 and tariff rate changes between 2001 and 2007

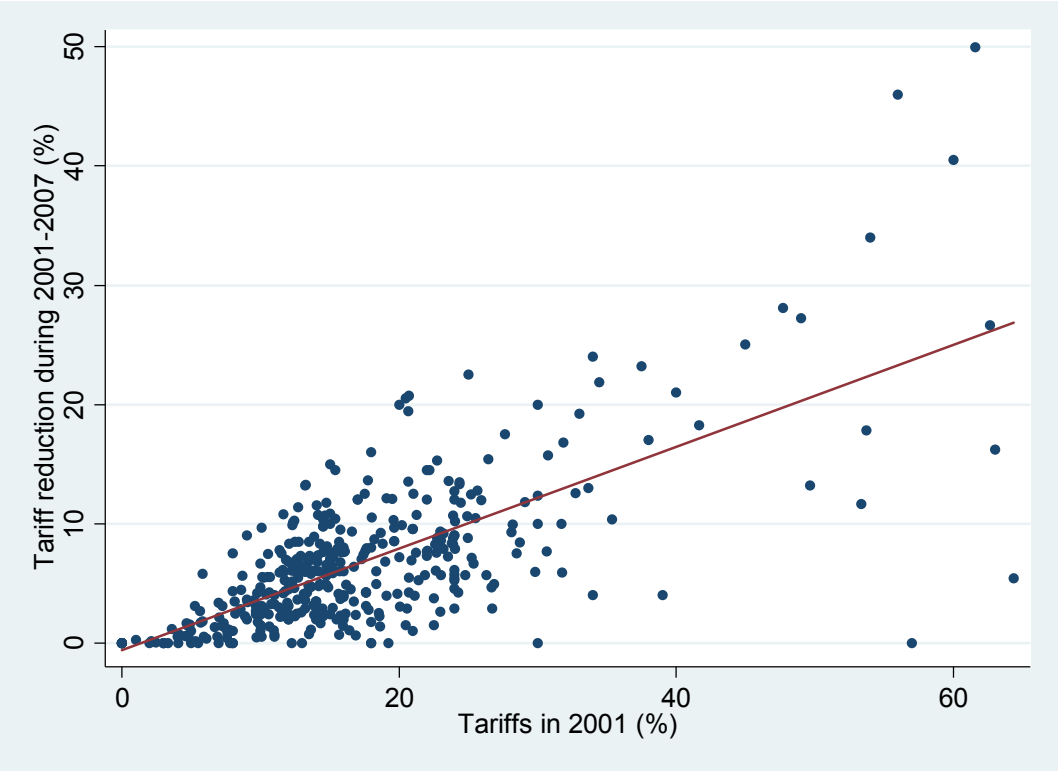

Table 1: Pre-WTO reform city characteristics

Dependent variable: Changes in output tariffs between 2001 and 2007							
Variable:	Log employment in 2001	Log output in 2001	Log capital in 2001	Log capital-labor ratio in 2001	Log wage rate in 2001	Growth in output between 1998 and 2001	Growth in employment between 1998 and 2001
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Estimates	0.003	0.002	0.005	0.026**	0.035**	0.031	0.084**
S.E.	(0.008)	(0.007)	(0.007)	(0.013)	(0.015)	(0.032)	(0.038)
Magnitude	1.07%	0.94%	1.89%	2.93%	2.99%	2.44%	4.40%

Note: Each column represents a regression on output tariffs on the variable in the column heading. The number of observations in each regression is 340. Robust standard errors are in parentheses. The last row shows the effect of a one-standard-deviation change in the variable in the column heading on the mean of changes in output tariffs. ***, ** and * denote significance at the 1, 5 and 10% level respectively.

Table 2: Output tariffs and SOEs

Dependent variable: output tariffs	(1)	(2)
Lagged employment share of SOEs	0.004	
	(0.003)	
Lagged output share of SOEs		0.004
		(0.003)
City fixed effects	X	X
Year fixed effects	X	X
City-specific linear trend	X	X
Observations	3,059	3,059

Note: Standard errors are clustered at the city level in parentheses. Regressions are weighted by the number of firms in the city. ***, ** and * denote significance at the 1, 5 and 10% level respectively.

Table 3: Main results

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable: SOEs share						
Output tariffs	0.485***	1.115***	1.116***	1.116***	1.386***	1.361***
	(0.187)	(0.253)	(0.253)	(0.253)	(0.380)	(0.376)
City fixed effects	X	X	X	X	X	X
Year fixed effects	X	X	X	X	X	X
City-specific linear trend	X	X	X	X	X	X
Input and external tariffs controls		X	X	X	X	X
FDI control			X	X	X	X
Special Economic Zones control				X	X	X
Employment decomposition controls					X	X
Political characteristics controls						X
Observations	3,398	3,398	3,398	3,398	2,660	2,660

Note: Standard errors are clustered at the city level in parentheses. Regressions are weighted by the number of firms in the city. ***, ** and * denote significance at the 1, 5 and 10% level respectively.

Table 4: Robustness checks

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dependent variable:	SOEs share							Privatization ratio	SOEs share
	Alternative definition of SOEs	Above-scale SOEs	Foreign firms excluded	Domestic employment	Output share of SOEs	Privatization ratio included	Continuous SOEs and non-SOEs		Pre-WTO period
Output tariffs	0.735**	1.273***	1.406***	1.283***	0.546*	1.304***	1.059***	0.069	0.206
	(0.327)	(0.379)	(0.487)	(0.408)	(0.330)	(0.359)	(0.306)	(0.091)	(0.337)
City fixed effects	X	X	X	X	X	X	X	X	X
Year fixed effects	X	X	X	X	X	X	X	X	X
City-specific linear trend	X	X	X	X	X	X	X	X	X
Other policy controls	X	X	X	X	X	X	X	X	X
Employment decomposition controls	X	X	X	X	X	X	X	X	
Political characteristics controls	X	X	X	X	X	X	X	X	
Observations	2,660	2,660	2,660	2,660	2,660	2,394	2,650	2,394	1,359

Note: Standard errors are clustered at the city level in parentheses. Other policy controls include input tariffs, external tariffs, FDI, and Special Economic Zones. Regressions are weighted by the number of firms in the city. ***, ** and * denote significance at the 1, 5 and 10% level respectively.

Table 5: Within- vs. inter-quantile productivity decomposition

	(1)	(2)
△ Employment share of SOEs	Within-quantile	Inter-quantile
△ Output tariffs	0.594**	0.032
	(0.261)	(0.084)
City fixed effects	X	X
Year fixed effects	X	X
City-specific linear trend	X	X
Other policy controls	X	X
Employment decomposition controls	X	X
Political characteristics controls	X	X
Observations	2,394	2,394

Note: Standard errors are clustered at the city level in parentheses. Other policy controls include input tariffs, external tariffs, FDI, and Special Economic Zones. Regressions are weighted by the number of firms in the city. ***, ** and * denote significance at the 1, 5 and 10% level respectively.

Table 6: Intra- vs. inter-industry reallocation

	(1)	(2)
△ Employment share of SOEs	Intra-industry	Inter-industry
△ Output tariffs	0.545**	0.218*
	(0.248)	(0.115)
City fixed effects	X	X
Year fixed effects	X	X
City-specific linear trend	X	X
Other policy controls	X	X
Employment decomposition controls	X	X
Political characteristics controls	X	X
Observations	2,394	2,394

Note: Standard errors are clustered at the city level in parentheses. Other policy controls include input tariffs, external tariffs, FDI, and Special Economic Zones. Regressions are weighted by the number of firms in the city. ***, ** and * denote significance at the 1, 5 and 10% level respectively.

Table 7: Intensive vs. extensive margin

	(1)	(2)
△ Employment share of SOEs	Intensive margin	Extensive margin
△ Output tariffs	0.584***	0.090
	(0.190)	(0.129)
City fixed effects	X	X
Year fixed effects	X	X
City-specific linear trend	X	X
Other policy controls	X	X
Employment decomposition controls	X	X
Political characteristics controls	X	X
Observations	2,394	2,348

Note: Standard errors are clustered at the city level in parentheses. Other policy controls include input tariffs, external tariffs, FDI, and Special Economic Zones. Regressions are weighted by the number of firms in the city. ***, ** and * denote significance at the 1, 5 and 10% level respectively.

Table 8: Above vs. below-city-level administration

	(1)	(2)
△ Employment share of SOEs	Above-city-level	Below-city-level
△ Output tariffs	0.078*	0.545**
	(0.047)	(0.232)
City fixed effects	X	X
Year fixed effects	X	X
City-specific linear trend	X	X
Other policy controls	X	X
Employment decomposition controls	X	X
Political characteristics controls	X	X
Observations	2,301	2,394

Note: Standard errors are clustered at the city level in parentheses. Other policy controls include input tariffs, external tariffs, FDI, and Special Economic Zones. Regressions are weighted by the number of firms in the city. ***, ** and * denote significance at the 1, 5 and 10% level respectively.